PERMIT ATTACHMENT AA

Facility Description – Section 2 of the Permit Application

Permit Number: WA 7890008967

The following listed documents are hereby incorporated, in their entirety, by reference into this Permit. Some of the documents are excerpts from the Permittees' DBVS Facility Research, Development, and Demonstration Dangerous Waste Permit Application dated May 10, 2004 (document #04-TED-036); hereafter called the Permit Application. Ecology has, as deemed necessary, modified specific language in the attachments. These modifications are described in the permit conditions (Parts I through V), and thereby supersede the language of the attachment. These incorporated attachments are enforceable conditions of this Permit, as modified by the specific permit conditions.

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FIGURES

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2.0 FACILITY DESCRIPTION

2.1 FACILITY SITING

The planned site location for the Test and Demonstration Facility is shown in Figure 2-1. The site is located immediately west of the 241-S Tank Farm in the 200 West Area of the Hanford Site. The wastes planned for treatment are currently stored in Tank 241-S-109; a 2,839,050-L (750,000-gal) SST located in the 200 West Area. The waste from Tank 241-S-109 will be transferred to a waste staging tank and/or waste receipt tank(s) at the planned Test and Demonstration Facility location after pretreatment.

The site is west of the existing 241-S Tank Farm fence in an already disturbed area and will support process and ancillary equipment for the DBVS. The proposed location allows close access to existing electrical and raw water utilities, telephone, and Hanford local area network services. Surface materials consist of soft sand and soil that are free from surface contamination. The site is sufficiently level to provide for equipment placement with minimum grading or excavation. Cooper Avenue, running north-south on the west side of the 241-S Tank Farm, provides ingress and egress to the area.

2.2 PHYSICAL PLANT

The Test and Demonstration Facility (Figures 2-2 and 2-3) will make use of existing infrastructure to the maximum extent possible. Because of the unit-specific installation, operational, and closure needs of the DBVS, some infrastructure elements may be modified, augmented, or added. Potential infrastructure elements include:

- Utilities (water, electric power, sewer, steam)
- Communications (telephone and computer)
- Roadways
- Radioactive material containment
- Hazardous material containment
- Secondary waste storage/transfer systems
- Treated waste storage/transfer systems.

Facility security provisions and signage will comply with applicable portions of WAC 173-303-310.

2.2.1 Bulk Vitrification System Components

The DBVS consists of trailer-mounted and skid-mounted equipment suitable for field installation, operation, and removal at the completion of the project. The system includes the major components, systems, and areas listed below, which are described in detail in Section 4.0.

The general arrangement of the following components for Phase 1 and for Phase 2 (Figures 2-2 and 2-3) includes:

- Waste retrieval system
- Waste staging tank and pumps
- Waste receipt tanks and pumps
- Process additive storage/handling
- Waste feed preparation (mixer/dryer)
- Vitrification container preparation system
- In-container vitrification (ICV®) system
- Electrical equipment
- Offgas treatment system
- Control and data acquisition system
- ILAW storage
- Secondary waste storage and handling (containers or tanks).

2.2.2 Support Systems

Support systems are systems that are required to operate the DBVS, but are not directly involved with the process. The support systems consist of:

- Control station
- Personnel contamination control and survey station
- Personnel rest areas (e.g., lunch room and restrooms)
- Change room
- Safety showers and eye wash stations
- Backup generator.

2.3 WASTE CHARACTERISTICS, RETRIEVAL/STORAGE, AND TRANSFER

2.3.1 Waste Characteristics

The waste in Tank 241-S-109 is stratified. In the bottom of the tank is a layer of sludge. On top of the sludge is a mixed saltcake solid and liquid layer and the top layer is drained saltcake. The salt cake waste is the source waste material for the Test and Demonstration Facility. Some characterization of the waste in Tank 241-S-109 was previously conducted. Characterization results represent the Best Basis Inventory (BBI) for the liquid and saltcake fraction of the tank waste. A detailed discussion of the waste characteristics is located in Section 6.2.

2.3.2 Waste Retrieval and Storage

The retrieval detail for Tank 241-S-109 is presented in RPP-18812, *Tank S-109 Partial Retrieval Functions and Requirements*, and has been submitted to Ecology for approval of the retrieval process.

There will be a difference in the retrieval of waste from Tank 241-S-109 and its transfer to the DBVS between Phases 1 and 2 of the program. During Phase 1, waste from Tank S-109 will be routed through a solids/liquid hydroclone separator and sensing instruments to a staging tank that will hold 3,780 L (1,000 gal) of material (Figure 2-4). The sensing instruments will provide process control or waste characterization information. Staging tank discharge will be pumped to either a DBVS waste receipt tank or, if not suitable for processing in the DBVS, to the DST system.

During Phase 2 the waste will be transferred directly to the waste receipt tanks. The transfer route will go through the solids/liquid hydroclone separator and sensing instrumentation, but bypass the 3,780 L (1,000 gal) waste staging tank (Figure 2-4).

The Test and Demonstration Facility will accept tank waste into waste receipt tanks with capacities shown in Table 2-1.

Table 2-1. Waste Receipt Tank Capacity

Phase	Number of Tanks	Capacity	Total Capacity
1	1	3,780 L (1,000 gal)	3,780 L (1,000 gal)
2	4	68,140 L (18,000 gal)	272,160 L (72,000 gal)

All waste storage tanks and containers including the waste staging tank and waste receipt tanks will be properly and legibly marked in accordance with the requirements of WAC 173-303-395(6). Containers will be managed in accordance with the requirements of WAC 173-303-630. All waste tank systems will comply with the design, installation, and operating requirements of WAC 173-303-640, as applicable. Tank system materials of construction will be selected with appropriate consideration for the corrosion potential of the materials stored and process conditions.

Secondary containment will be provided for all tanks in the form of double-walled tankage or containment structures with sumps. Containment provisions will be designed and constructed for compliance with WAC 173-303-640(4).

During Phase 1, the waste staging tank and waste receipt tank will be double shell tanks or placed in containment structures with sumps (Figures 2-2 and 2-3). For Phase 2, the waste staging tank will be bypassed but will either remain in its structure or be removed and decontaminated in compliance with the Test and Demonstration Facility closure plan (Section 11.0).

2.3.3 Waste Transfer

Waste transfer will be in the form of waterborne salt solution. Waste left in a waste receipt tank at the end of a campaign may be transferred to another tank and mixed with incoming waste for processing. A waste transfer line water flush may be made after each batch transfer of waste feed, as needed. Waste transfer will occur only after verification that all systems are ready for the transfer/receipt of waste. The vitrification station will be located beneath the dried waste hoppers for gravity feed of waste to the container. The mixer/dryer, vitrification, cooldown, and topoff/survey stations will be provided with radiation shielding and spill containment curbs.

Secondary containment will be provided for liquid waste transfer operations in the form of hose-in-hose or pipe-in-pipe transfer lines. Dried waste transfer from the mixer/dryer to the hopper will have secondary containment. Dried waste transfer from the hopper to the container will be conducted inside a removable hood sealed to the container top. Cleanup of spills within the hood will be performed using a containment system.

2.4 TREATED WASTE PACKAGING

Containers of treated waste resulting from the bulk vitrification process will be placed in a dedicated temporary storage area at the Test and Demonstration Facility site (Figure 2-2) during the RD&D permit duration. By generating immobilized treated waste directly in the container, the treatment container also serves as the final disposal container. The storage area will be designed to hold all containers of treated waste generated during the project. The storage area will meet the provisions of WAC 173-303-630(7)(c)(i) and (ii) which are applicable for storage areas that store containers holding only wastes that do not contain free liquids (i.e., the bulk vitrification waste containers):

> *(i) The storage area is sloped or otherwise designed and operated to drain and remove liquid resulting from precipitation; or*
>
> *(ii) The containers are elevated or are otherwise protected from contact with accumulated liquids.*

All containers, handling procedures, and handling equipment will meet the waste acceptance criteria of the accepting disposal facility. Final disposal of treated waste will be at a permitted Hanford Site facility.

2.5 NON-REGULATED MATERIALS/SYSTEMS

Information provided in the following sections is general in nature and represents the minimum considerations for handling of non-regulated materials. Management of specific materials related to DBVS operation is discussed in Section 4.0.

2.5.1 Potable Water

Water for process use will be transported by tanker truck to the Test and Demonstration Facility. The water source will provide settled river water or potable water. Backflow prevention will be provided to prevent the backflow of potable water to the tanker truck by utilizing an air gap as

the backflow mechanism, or other approved backflow prevention device, as applicable. Backflow prevention devices will be Washington State-certified models accessible for inspection by a water purveyor in a non-radiological zone.

Administrative and engineering controls (e.g., scheduled inspections, containment pads and curbs) will be in place to avoid spillage of water (which could potentially result in the mobilization of contaminants in the vadose zone).

2.5.2 Raw Materials, Process Additives, and Consumables

Raw materials, process additives, and other consumable materials will be stored in tanks, containers, or bulk storage in the Test and Demonstration Facility (Figure 2-2). Storage and delivery systems will be designed to accommodate the ingress and egress of trucks delivering raw materials and consumables. This accommodation may be composed of docks or stockpiles that allow for ease of loading/off-loading of the materials and consumables. Soil storage may be provided by a hopper truck with pneumatic conveying of soil to the DBVS during both phases. For Phase 2, a soil stockpile may be used in lieu of the hopper truck due to the higher usage rate of soil. Refractory sand will be stored in a stockpile for both phases. Other process additives will be stored in containers. The design and location of the loading/off-loading areas will be compatible with existing Hanford Site roadways and/or other roadways added for the planned Test and Demonstration Facility.

2.5.3 Electric Power System

Under normal operating conditions, all electric power for the Test and Demonstration Facility will be obtained from the Hanford Site grid through a local transformer. A backup generator will be located at the site to provide power in the event grid power is lost. The backup generator will have about a 1,200-kilowatt total load rating. The generator will be diesel-powered. A 37,850-L (10,000-gal) diesel fuel storage tank will be provided for the generator drive motor.

The backup generator is capable of powering the Test and Demonstration Facility systems with 480 volt loads on a continuous basis. However, it will be intended only for use in continuous operation of the offgas treatment system, system pumps, the control system, and other electrically-operated equipment needed for a controlled system shutdown in the event of a power outage and achieving full system shutdown until power from the Hanford Site grid can be restored.

2.6 SECONDARY WASTES

A variety of secondary wastes may be generated during the planned project. This section covers general requirements for management of expected secondary wastes. Details are provided in Section 4.0.

Secondary waste streams such as liquid effluent will be disposed of in the Liquid Effluent Retention Facility, the Effluent Treatment Facility (ETF), or the 200 Area Treated Effluent Disposal Facility, as appropriate. Disposition of solid waste streams will be managed in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, and the waste

acceptance criteria of the receiving facility, as necessary. Disposition of secondary liquid effluent waste streams will be managed in accordance with HNF-3172, *Liquid Waste Processing Facilities Waste Acceptance Criteria*, and the acceptance criteria of the receiving facility, as necessary.

Dedicated tanks will be provided for onsite liquid waste storage pending sampling and transfer to a treatment facility. It is anticipated that up to ten 68,140L (18,000 gal) tanks may be used. The actual capacity and number of tanks will be determined during the DBVS project. Tank systems will comply with the applicable portions of WAC 173-303-640.

Storage tank capacity requirements are based on the following assumptions:

- Dryer condensate = 3.40 gpm x 60 min/hr x 7.9 hr/dryer batch x 8 dryer batches ≈ 12,900 gal
- Quench blowdown = 2.39 gpm x 60 min/hr x 168 hr/ICV batch ≈ 24,100 gal
- Tri-Mer Scrubber blowdown[1] = 4.29 gpm x 60 min/hr x 200 hr/ICV batch ≈ 51,500 gal
- Total flow to ETF per ICV container ≈ 88,500 gal per container.

Offgas treatment system equipment designs will comply with the applicable requirements of WAC 173-400, 173-401, 173-460, WAC 246-247, and ASME AG-1, *Code on Nuclear Air and Gas Treatment*. The design of the gaseous and particulate effluent monitoring system will comply with ANSI/HPS N13.1, *Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities.* The process equipment will interface with systems that transport secondary waste to appropriate locations.

2.7 IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE MATERIALS

In the course of the RD&D project, it is unlikely that tank waste batches will be received that are incompatible with other materials present in the facility, especially process additives. DOE has identified flammable/toxic gases as a potential waste incompatibility. Incompatibilities will be addressed in DOE safety documentation to comply with WAC 173-303-395. Process knowledge, process history, pertinent literature on waste chemistry and tank history and waste analysis will be used to address the Dangerous Waste Codes D001 (Ignitability), D002 (Corrosivity), and D003 (Reactivity) for the waste before transfer to the Test and Demonstration Facility. Verification sampling to document the absence of characteristic codes will be performed on the first batch of retrieved waste as part of the WRS prior to transfer to the DBVS waste receipt tank.

2.8 OCCUPATIONAL SAFETY AND HEALTH

All buildings, structures, and equipment utilized in the planned project will incorporate design features that comply with applicable subparts of Occupational Safety and Health Administration (OSHA) Regulation 29 CFR 1910, “Occupational Safety and Health Standards.”

[1] Only if used as a backup to the SCR.

Figure 2-1. Planned Site Location of the Test and Demonstration Facility

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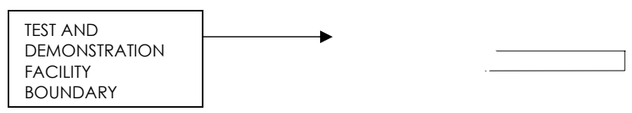

Figure 2-2. Test and Demonstration Facility Site and Equipment Layout - Page 1

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Figure 2-3. Test and Demonstration Facility Site and Equipment Layout - Page 2

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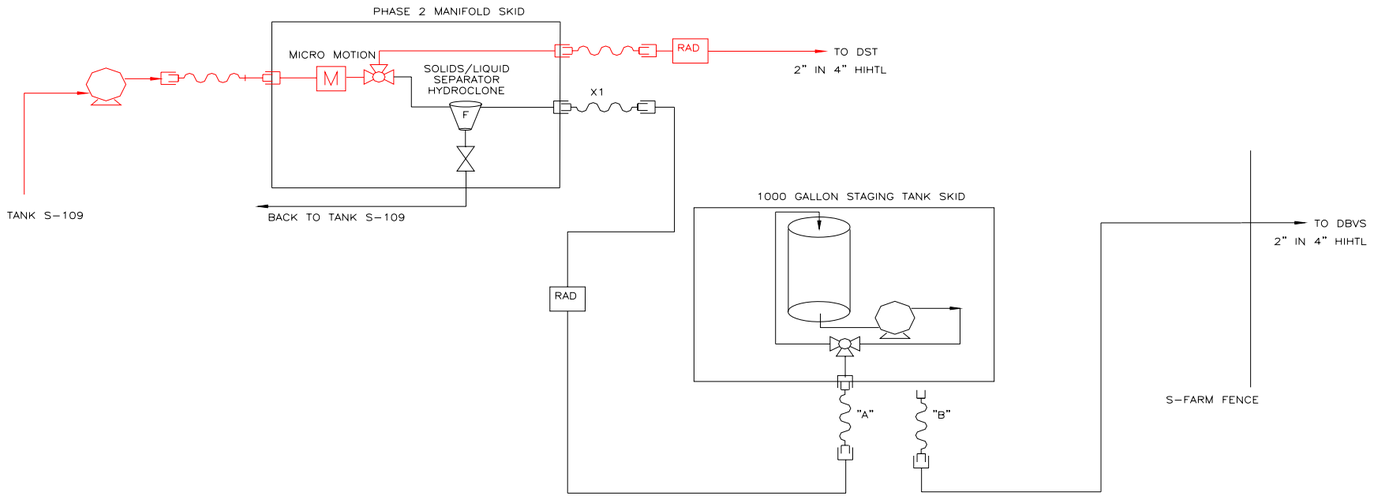
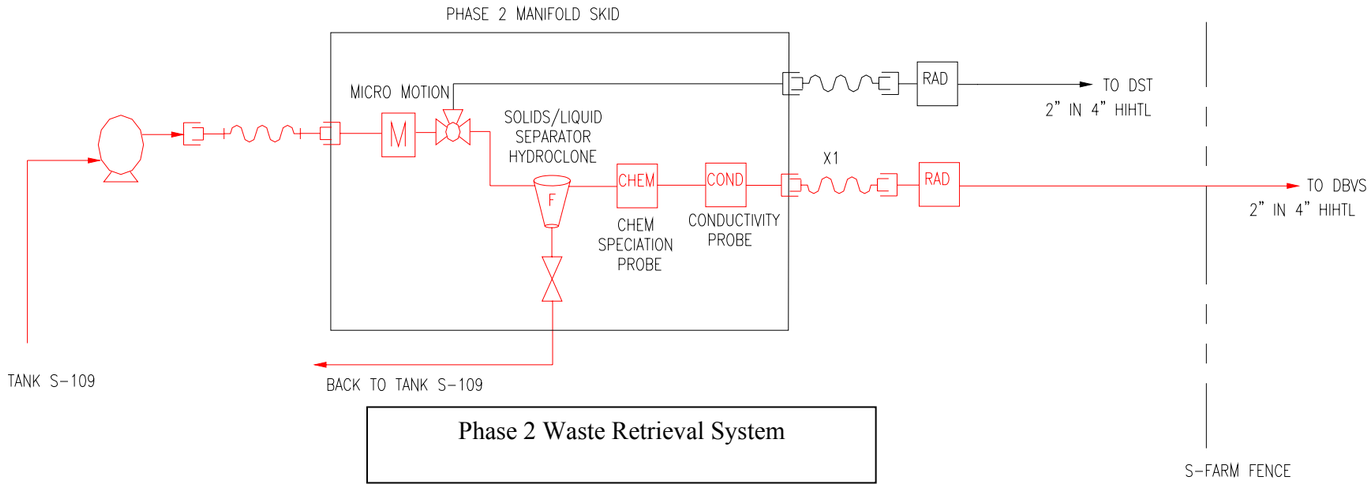
Figure 2-4. Waste Retrieval System for Phase 1 and Phase 2



Phase 1 Waste Retrieval System



Phase 2 Waste Retrieval System